

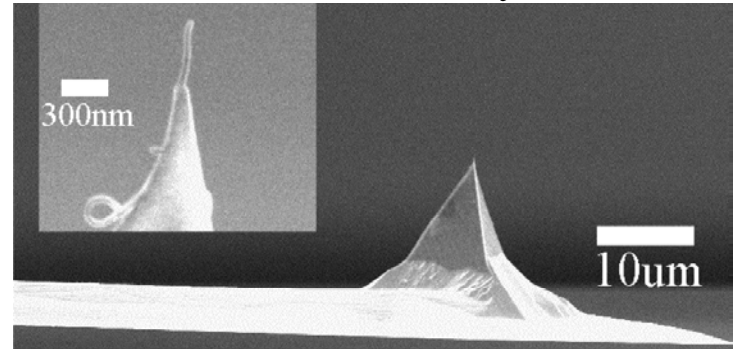
Integration of Carbon Nanotubes, Magnetic Nanocrystals, and Silicon Microstructures for Ultra-High-Resolution Magnetic Force Microscopy

NIRT-0103548

PI: Kathryn A. Moler, Stanford University

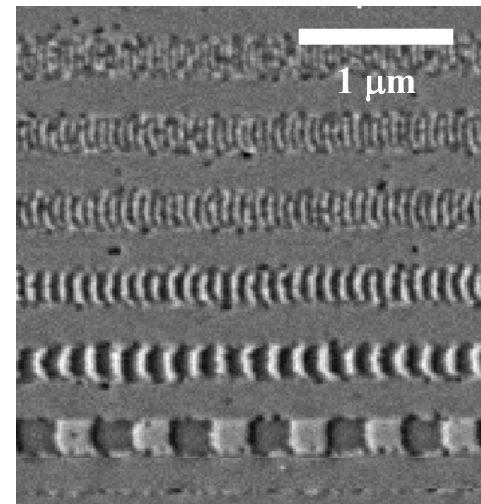
co-PI's: Mounqi Bawendi, MIT; Hongjie Dai, Stanford; Tom Kenny, Stanford

Refrigerator magnets can either attract or repel each other. Close your eyes, hold a magnet in your hand, and move it over your stove: you can easily find the iron kettle! Similarly, a Magnetic Force Microscope uses a sharp magnetic pyramid on the tip of a tiny silicon diving board, called a cantilever, to map out interesting magnetic materials and devices. We have developed nanotechnology for making ultra-sharp magnetic tips out of metal-coated nanotubes, and have demonstrated the ability to resolve 17 nanometer features, a factor of 2 improvement over commercially available MFM tips.



Above: a sharp pyramid on a commercial MFM tip. Inset: a carbon nanotube coated with metal makes an ultra-sharp tip. Our latest tips have diameters of less than 15 nm.

Below: image of an experimental hard drive.



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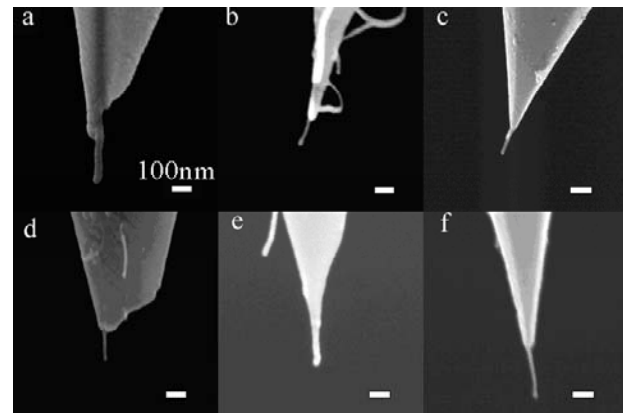
EDUCATION

Two postdocs, nine graduate students, and two undergraduates have participated in this project, developing the skills to become major contributors to nanoscale science and engineering.



COLLABORATION WITH INDUSTRY

We are collaborating with Maxtor and Seagate, two of the leading manufacturers of information storage devices, to characterize experimental media for information storage technology.



INFRASTRUCTURE

We are developing the next generation of magnetic imaging technology.